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REVUE D'ENERGIE ATOMIQUE

ОБЗОРЫ ПО АТОМНОЙ ЭНЕРГИИ

REVISTA DE ENERGIA ATOMICA

CUMULATIVE INDEX

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REVISTA DE ENERGIA ATOMICA

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ORGANISMO INTERNACIONAL DE ENERGIA ATOMICA – VIENA, 1966

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FOREWORD

The Cumulative Index to the Atomic Energy Review covers volumes 1-3 (1963-1965). It consists of a section giving full bibliographical data and an abstract for each review published in the Atomic Energy Review within this period. It also includes alphabetized lists of all titles, together with personal author, corporate author and subject indexes.

The Cumulative Index was compiled with the aid of a computer by a Generalized Information Processing System (GIPSY) developed by the Documentation Section of the Division of Scientific and Technical Information of the International Atomic Energy Agency.

A limited amount of editing of the titles and abstracts has been necessary to give consistency of spelling; this ensures that identical terms are not printed in separate locations in the Index and circumvents the limitations inherent in computer-processing the data. Thus all Greek letters have been spelled out phonetically; complex expressions, such as chemical formulae, physical symbols, constants, etc., have been expressed in an easy-to-read coding notation or have been written out in full to avoid ambiguity. Authors' names and other non-English words containing diacritical signs, such as accents, umlauts, etc., have been transliterated, and certain punctuation signs have been changed.

The subject index, the principal feature of this publication, represents the first attempt by the Documentation Section to provide a detailed subject approach to technical papers based on the automatic extraction of keywords from their titles and abstracts. Each entry in the subject index is generated by an improved key-word-in-context (KWIC) process whereby keywords are automatically selected from the title and the abstract of the article. Each keyword selected by the programme is posted in alphabetical order along the central column on each page, together with all or part of the title, or a part of the abstract from which it was selected. These entries are 95 characters in length. Because the keyword is always posted at a fixed point within the line and because of the 95 character limitation, a permutation or 'wrap-around' of the surrounding context may occur in order to fully utilize the space available. Entries which exceed 95 characters in length are truncated so that each entry of keyword-plus-context can be printed on a single line. The end of the title is indicated by an equal sign. To facilitate rapid scanning of the entries each new keyword is accentuated by overprinting. To the right of each entry in the KWIC subject index the corresponding volume, issue and page numbers are printed.

A convenient way to use the subject index is to scan the keyword column vertically until a keyword of interest is located. A glance at the surrounding context, in which it appears, will usually enable the reader to decide whether the entry is relevant to his interests.

Atomic Energy Review readers' comments and suggestions on the usefulness and possible means of improving the index will be greatly appreciated. Please forward all correspondence to the editor of the Atomic Energy Review - Dr. M.V. Ivanov, Division of Scientific and Technical Information, International Atomic Energy Agency, Kaerntner Ring 11, Vienna I, Austria.

ABSTRACTS OF PAPERS

PROKSCH E.
OESTERREICHISCHE STUDIENGESELLSCHAFT FUER ATOMENERGIE,
REAKTORZENTRUM SEIBERSDORF, AUSTRIA.
1(1) 5
PURIFICATION OF REACTOR MODERATOR-COOLANTS.
VOL. 1, NO. 1 (1963) P. 5-42.

THIS REVIEW COVERS THE PROBLEMS RELATED TO THE PURIFICATION OF LIGHT AND HEAVY WATER AND THE ORGANIC LIQUIDS USED AS MODERATOR-COOLANTS FOR NUCLEAR REACTORS. THE DIFFERENT SOURCES OF IMPURITIES ARE DESCRIBED. CORROSION IS THE MAIN SOURCE IN WATER SYSTEMS, RADIOLYTIC TAR FORMATION IN ORGANIC SYSTEMS. SPECIFIED AND ACTUALLY OBSERVED VALUES FOR THE CONCENTRATION OF DIFFERENT IMPURITIES ARE THOROUGHLY DISCUSSED. THE METHODS AND THE EQUIPMENT USED IN PURIFICATION ARE DESCRIBED. THE MAIN UNITS TO BE CONSIDERED ARE ION EXCHANGERS, FILTERS, DEGASIFIERS, AND DISTILLATION COLUMNS. DESIGN, CONSTRUCTION, OPERATION AND TRENDS OF DEVELOPMENT ARE DISCUSSED.
THE WHOLE PROBLEM OF PURIFICATION CAN BE SOLVED AT PRESENT BY WELL DEVELOPED METHODS AND WITH CONSIDERABLE SUCCESS. HOWEVER, MOST OF THEM ARE CAPABLE OF FURTHER IMPROVEMENT.

BUSH S.H.
GENERAL ELECTRIC COMPANY, RICHLAND, WASHINGTON, UNITED STATES OF AMERICA.
1(1) 43
SPECIAL MATERIALS FOR REACTOR CONSTRUCTION AND THEIR METHODS OF FABRICATION.
VOL. 1, NO. 1 (1963) P. 43-92.

A SURVEY HAS BEEN MADE OF THE LITERATURE PUBLISHED SINCE THE SECOND UNITED NATIONS INTERNATIONAL CONFERENCE ON THE PEACEFUL USES OF ATOMIC ENERGY DEALING WITH THE MATERIALS USED IN NUCLEAR REACTORS AND THE METHODS OF FABRICATION OF THESE MATERIALS INTO REACTOR COMPONENTS. THE REACTOR CONCEPTS EXAMINED WERE THOSE FOR CIVILIAN POWER GENERATION - COOLANTS INCLUDED WATER, DEUTERIUM OXIDE, SODIUM, ORGANIC LIQUIDS, OR GASES. THE REACTOR COMPONENTS CONSIDERED WERE THE PRESSURE VESSEL, PRESSURE TUBES, PRIMARY COOLANT PIPING, CALANDRIAS, GRIDS, HEAT EXCHANGERS AND STEAM GENERATORS, AND OTHER INTERNAL 'HARDWARE' (VALVES, PUMPS, GASKETS, BOLTS, ETC.). THE STRUCTURAL MATERIALS USED FOR THESE COMPONENT APPLICATIONS WERE EXAMINED. METHODS OF COMPONENT FABRICATION ARE REPORTED WHEN THEY ARE BELIEVED TO REPRESENT MAJOR CHANGES OR ADVANCES. PARTICULAR EMPHASIS WAS GIVEN TO THE JOINING OF MATERIALS. ALSO, FUTURE TRENDS IN MATERIALS AND METHODS OF FABRICATION WERE ANALYSED TO ANTICIPATE LIMITATIONS IN THE USE OF CURRENTLY POPULAR MATERIALS. CONCRETE, LAMINATED AND ALLOY-STEEL PRESSURE VESSELS ARE DISCUSSED WITHIN THE FRAMEWORK OF FUTURE TRENDS. POSSIBLE LIMITATIONS OF HIGH-TEMPERATURE ALLOYS DUE TO RADIATION EFFECTS ARE CONSIDERED TO THE EXTENT THAT THEY INFLUENCE THE DESIGN OF REACTOR COMPONENTS.

HARA R. 1(1) 93
INTERNATIONAL ATOMIC ENERGY AGENCY, VIENNA.
CHEMISTRY RESEARCH BASED ON RESEARCH REACTORS.
VOL. 1, NO. 1 (1963) P. 93-140.

MANY NATIONS HAVE BUILT OR ARE BUILDING RESEARCH REACTORS AND ARE FACING THE PROBLEM OF THE EFFICIENT UTILIZATION AND THE SELECTION OF SUITABLE AREAS OF RESEARCH. RESEARCH REACTORS HAVE BEEN APPLIED TO VARIOUS FIELDS OF SCIENCE AND TECHNOLOGY, AMONG WHICH BOTH CHEMISTRY AND PHYSICS HAVE RECEIVED PRIMARY ATTENTION. CHEMISTRY RESEARCH WITH RESEARCH REACTORS IS EXCEEDINGLY IMPORTANT FOR MOST CENTRES, ESPECIALLY FOR NEWLY DEVELOPED ONES, SINCE MOST CHEMISTRY RESEARCH IS EASY TO START, DOES NOT REQUIRE EXPENSIVE AUXILIARY EQUIPMENT OR FACILITIES AND CAN BE APPLIED PRACTICALLY. BASED ON A SYSTEMATIC SURVEY, THIS ARTICLE PROVIDES A PICTURE OF MAJOR CHEMISTRY RESEARCH WHICH HAS BEEN CARRIED OUT WITH RESEARCH REACTORS AND THE BASIC CONCEPT OF THE APPLICATION OF REACTORS TO THE FIELD OF CHEMISTRY. THOUGH THE PRIMARY EMPHASIS IS PLACED ON CHEMISTRY RESEARCH CARRIED OUT WITH LOW AND MEDIUM FLUX REACTORS, A BRIEF DESCRIPTION IS GIVEN OF THE ROLE OF HIGH FLUX REACTORS IN CHEMISTRY RESEARCH AND OF THE FUTURE DEVELOPMENT OF CHEMONUCLEAR REACTORS. THIS ARTICLE, BECAUSE OF ITS BASIC CONCEPT, COULD BE USED BY SCIENTISTS WHO ARE PLANNING CHEMISTRY RESEARCH PROGRAMMES.

SHEVCHENKO V. 1(1)14
INTERNATIONAL ATOMIC ENERGY AGENCY, VIENNA.
DIRECT INTERACTIONS AND NUCLEAR REACTION MECHANISM.
REPORT ON AN INTERNATIONAL CONFERENCE AT PADUA, ITALY, 3 - 8 SEPTEMBER 1962.
CONFERENCES AND SYMPOSIA.
VOL. 1, NO. 1 (1963) P. 141-148.

THAMER B.J. 1(2)
LOS ALAMOS SCIENTIFIC LABORATORY, UNIVERSITY OF CALIFORNIA, LOS ALAMOS, NEW MEXICO, UNITED STATES OF AMERICA.
THE CONTAINMENT OF LIQUID-METAL FUELS AT 500-1000 DEG C.
VOL. 1, NO. 2 (1963) P. 3-36.

SOME CORROSIVE EFFECTS ARE ILLUSTRATED BY OBSERVATIONS IN THE AREA OF METAL COOLANTS, PARTICULARLY THE ALKALI METALS. THIS SUBJECT AND THE FOLLOWING AREAS ARE DISCUSSED -- THE CONTAINMENT OF THE PU-FE EUTECTIC IN TANTALUM, PU-CE-CO ALLOYS IN TANTALUM, NIOBIUM, MOLYBDENUM, AND CERAMICS, CE-CO ALLOYS IN TANTALUM, PU-CE-NI AND PU-CE-CU ALLOYS IN TANTALUM, NIOBIUM, AND MOLYBDENUM, U-PU-MN ALLOYS IN YTTRIUM AND CERAMICS, U-MN EUTECTIC IN YTTRIUM, TANTALUM, NIOBIUM, AND CERAMICS, U-CR AND U-FE EUTECTICS IN YTTRIUM, TANTALUM, AND NIOBIUM, BI-U ALLOYS IN STEELS, GRAPHITE, TANTALUM, MOLYBDENUM, BERYLLIUM, AND YTTRIUM, BI-PU ALLOYS IN TANTALUM, NIOBIUM, AND MOLYBDENUM, ALLOYS OF AL-U-TH IN YTTRIUM, TANTALUM, AND NIOBIUM, AL-U ALLOYS IN YTTRIUM, TANTALUM, NIOBIUM, AND TITANIUM, AND MG-TH ALLOYS IN TANTALUM AND NIOBIUM. THESE SUBJECTS HAVE BEEN REVIEWED UP TO OCTOBER OF 1962.

BEHOUNEK F. 1(2) 3
INSTITUTE OF NUCLEAR RESEARCH, CZECHOSLOVAK ACADEMY OF SCIENCES, PRAGUE, CZECHOSLOVAK SOCIALIST REPUBLIC.
RECENT PROGRESS IN DOSIMETRY OF IONIZING RADIATIONS.
VOL. 1, NO. 2 (1963) P. 37-97.

THE PAPER CONSIDERS ALL METHODS OF MEASURING IONIZING RADIATION WHICH HAVE BEEN DEVELOPED DURING THE PAST FEW YEARS, I.E. THE IONIZATION CHAMBER METHOD, COUNTING, CHEMICAL, PHOTOGRAPHIC, COLORIMETRIC, LUMINESCENT AND CALORIMETRIC METHODS. SPECIAL

1) 93 ATTENTION IS DEVOTED TO THOSE DOSIMETRIC METHODS WHICH HAVE BEEN
STUDIED MORE EXTENSIVELY - SCINTILLATION SPECTROMETRY,
SEMICONDUCTOR DETECTORS, LUMINESCENT CHAMBERS AND SPARK CHAMBERS.
TERMINATION OF SOME BASIC VALUES AND CALIBRATION AND CORRECTION
PROCEDURES.
IN CONCLUSION THE MOST IMPORTANT PROGRESS ACHIEVED TO DATE IS
REVIEWED AND THOSE FIELDS WHERE FURTHER IMPROVEMENT IS MOST
NECESSARY ARE DISCUSSED.

HAUSNER H.H.
POLYTECHNIC INSTITUTE OF BROOKLYN, NEW YORK, UNITED STATES OF
AMERICA.
BERYLLIUM AS A MODERATOR AND REFLECTOR FOR NUCLEAR REACTORS.
1(2) 99
VOL. 1, NO. 2 (1963) P. 99-166.

BERYLLIUM IS CONSIDERED TO BE BASICALLY AN EXCELLENT MATERIAL FOR
MODERATORS AND REFLECTORS IN NUCLEAR REACTORS, BECAUSE OF ITS
NUCLEAR PROPERTIES AND MANY OF ITS OTHER PHYSICAL AND MECHANICAL
PROPERTIES. ALTHOUGH KNOWN FOR A LONG TIME, BERYLLIUM HAS BEEN
DEVELOPED INTO AN ENGINEERING MATERIAL ONLY DURING THE LAST FEW
YEARS. THIS REVIEW COVERS THE LATEST INTERNATIONAL INFORMATION ON
BERYLLIUM BOTH AS A METAL AND AS AN OXIDE. IT COVERS THE
OCCURRENCE OF BERYLLIUM IN NATURE, ITS EXTRACTION AND FABRICATION
IN THE METALLIC AND OXIDIC FORM. THE PHYSICAL METALLURGY IS
EXTENSIVELY DISCUSSED AND SPECIAL EMPHASIS IS GIVEN TO THE
1)14 IMPORTANT PROBLEMS OF BERYLLIUM DUCTILITY. BASED ON THE MOST
RECENT RESEARCH AND DEVELOPMENT WORK, PHYSICAL, MECHANICAL,
CHEMICAL AND NUCLEAR PROPERTIES OF BERYLLIUM AND BERYLLIUM OXIDE
ARE DESCRIBED IN DETAIL. THE BEHAVIOUR OF THESE MATERIALS IN
NEUTRON IRRADIATION IS BRIEFLY DISCUSSED. THE APPLICATION OF
BERYLLIUM OR BERYLLIUM OXIDE AS A MATRIX MATERIAL FOR
DISPERSION-TYPE FUEL ELEMENTS IS DESCRIBED. EXAMPLES ARE GIVEN
FOR BERYLLIUM MATERIALS AT PRESENT BEING USED IN NUCLEAR
REACTORS. DATA ON METALLOGRAPHY ARE REPORTED AND A BRIEF REVIEW
2) IS GIVEN OF THE HEALTH HAZARDS IN HANDLING BERYLLIUM AND HOW TO
OVERCOME THEM. THE BIBLIOGRAPHY AT THE END OF THIS REVIEW
CONTAINS 99 OF THE MOST RECENT REFERENCES TO THE BERYLLIUM
LITERATURE.

GROSS B.
INTERNATIONAL ATOMIC ENERGY AGENCY, VIENNA.
RADIOACTIVE DATING.
1(2)167
REPORT ON AN INTERNATIONAL SYMPOSIUM AT ATHENS, GREECE, 19 - 23
NOVEMBER 1962.
CONFERENCES AND SYMPOSIA.
VOL. 1, NO. 2 (1963) P. 167-171.

JAKESOVA L., JAKES D.
INSTITUTE OF NUCLEAR RESEARCH, CZECHOSLOVAK ACADEMY OF SCIENCES,
PRAGUE, CZECHOSLOVAK SOCIALIST REPUBLIC.
CARBIDES, NITRIDES AND SILICIDES OF URANIUM AS PROMISING NUCLEAR FUEL.
1(3) 3
VOL. 1, NO. 3 (1963) P. 3-46.

NEW FORMS OF NUCLEAR FUEL - CARBIDES, MONONITRIDE AND SILICIDES
2) 3 OF URANIUM - ARE OPENING UP NEW WAYS OF DEVELOPING
HIGH-TEMPERATURE REACTORS.
THE REVIEW DISCUSSES THE CHEMICAL, PHYSICAL AND MECHANICAL
PROPERTIES OF THESE COMPOUNDS -- TECHNIQUES FOR OBTAINING AND
COMPACTING UC, UC2, UN AND URANIUM SILICIDES, AND THEIR BASIC
CERMETS -- WAYS IN WHICH THEY ARE USED IN REACTORS -- AND
POSSIBLE FUEL-ELEMENT CANNING MATERIALS. RESISTANCE TO RADIATION
IS EVALUATED ON THE BASIS OF THE STUDIES CARRIED OUT.
FINAL JUDGEMENT ON THE MERITS AND DRAWBACKS OF THESE MATERIALS

WILL HAVE TO AWAIT THE RESULT OF FURTHER INVESTIGATION. THIS IS PARTICULARLY THE CASE WITH THE NITRIDES AND SILICIDES.

SANI L.
E.N.E.E., DIREZIONE COSTRUZIONI CENTRALI TERMICHE E NUCLEARI, ROME, ITALY.
ANALYSIS OF DESIGN CRITERIA FOR BOILING WATER REACTORS.
VOL. 1, NO. 3 (1963) P. 47-118.

THIS PAPER ILLUSTRATES THE DESIGN CRITERIA FOR BWR NUCLEAR POWER PLANTS. THE PRELIMINARY STUDY OF THE PLANT THERMODYNAMICS IS FOLLOWED BY AN ANALYSIS OF THE PARAMETERS AFFECTING THE THERMAL DESIGN OF THE CORE. PARTICULAR ATTENTION IS PAID TO THE CORE THERMAL-HYDRAULIC DESIGN, IN VIEW OF THE ATTAINMENT OF FAIRLY HIGH POWER DENSITY VALUES WITHOUT COMPROMISING THE CORE SAFETY AND/OR THE SYSTEM STABILITY. THE CORE NUCLEAR DESIGN MAY FINALLY BE UNDERTAKEN, WITH THE AIM OF ACHIEVING TWO MAJOR OBJECTIVES, ECONOMIC OPTIMIZATION AND NUCLEAR SAFETY.

MEYER R.A., RICKARD C.L.
GENERAL ATOMIC DIVISION, GENERAL DYNAMICS CORPORATION, SAN DIEGO, CALIFORNIA, UNITED STATES OF AMERICA.
THE IMPACT OF GRAPHITE FUEL DEVELOPMENT ON HIGH-TEMPERATURE STEAM GENERATION.
CURRENT RESEARCH AND DEVELOPMENT.
VOL. 1, NO. 3 (1963) P. 119-139.

THE RECENT DEVELOPMENT IN HIGH-TEMPERATURE GRAPHITE FUELS GIVES PROMISE OF ALLOWING FUEL SURFACE TEMPERATURES OF APPROXIMATELY 1800 DEG F, PERMITTING THE TRANSFER OF HEAT TO MAKE STEAM OF 1000 DEG TO 1100 DEG F IN RANGE, WHICH IN TURN MAKES POSSIBLE NET PLANT EFFICIENCIES OF OVER 40 PER CENT. THE THERMODYNAMIC AND ECONOMIC INCENTIVE FOR THE DEVELOPMENT OF THIS NEW HIGH-TEMPERATURE FUEL, THE POTENTIAL IT HOLDS FOR THE GENERATION OF HIGH-TEMPERATURE STEAM, AND THE ASSOCIATED DEVELOPMENT AND TESTING WORK ARE DISCUSSED IN THIS PAPER.
THE HTGR FUEL ELEMENT IS OF THE SOLID SEMIHOMOGENEOUS TYPE IN WHICH GRAPHITE SERVES AS THE MODERATOR, CLADDING FUEL MATRIX AND STRUCTURE. THE URANIUM AND THORIUM WITHIN THE FUEL COMPACTS ARE IN THE FORM OF CARBIDES, UNIFORMLY DISPERSED AS PARTICLES IN A GRAPHITE MATRIX. THE (TH, U)C2 PARTICLES ARE 150 TO 400 MICROMILLIMETERS IN DIAMETER. EACH PARTICLE IS PYROLYTICALLY COATED WITH 50- TO 60-MICROMILLIMETERS-THICK DENSE CARBON.
THE FUEL ELEMENT DEVELOPMENT AND TESTING PROGRAMME CONSISTED IN DEVELOPING NEW PROCESSES FOR MAKING NEW MATERIALS AS WELL AS EVALUATING EXISTING MATERIALS FOR THE VARIOUS PARTS OF THE FUEL ELEMENT. BOTH OUT-OF-PILE AND IN-PILE TESTS, IN WHICH THE ENVIRONMENT WAS SELECTED TO DUPLICATE THE CONDITIONS OF THE REACTOR, WERE EXTENSIVELY EMPLOYED. THE PERFORMANCE OF THE CARBON COATINGS OF THE FUEL PARTICLES WAS ALSO EVALUATED IN SOME OF THESE IRRADIATION TESTS. MORE THAN 40 DIFFERENT COMPACTS WERE IRRADIATED AND METALLOGRAPHICALLY EXAMINED AFTER IRRADIATIONS RANGING FROM 15000- TO 60000-MWD/T EXPOSURE OVER THE TEMPERATURE RANGE FROM 1000 DEG TO 2100 DEG C -- THE FUEL PARTICLES AND COATINGS REMAINED INTACT. A PROGRAMME FOR THE DEVELOPMENT OF THIS NEW FUEL WAS INITIATED IN 1958 AS PART OF THE DEVELOPMENT PROGRAMME FOR THE 40-MW(E) HIGH-TEMPERATURE GAS-COOLED REACTOR (HTGR) FOR THE PEACH BOTTOM, PENNSYLVANIA NUCLEAR POWER STATION, WHICH IS CURRENTLY UNDER CONSTRUCTION. THIS DEVELOPMENT WORK WAS SUCCESSFULLY COMPLETED LAST YEAR. FURTHER DEVELOPMENT AND APPLICATION OF THE NEW FUEL HAVE BEEN THE SUBJECT OF A RESEARCH AND DEVELOPMENT PROGRAMME BEING CARRIED ON JOINTLY BY GENERAL ATOMIC AND EMPIRE STATE ATOMIC DEVELOPMENT ASSOCIATES, INC., (ESADA), WITH THE OBJECTIVE OF A 300- TO 500-MW(E) HTGR PLANT FOR NEW YORK STATE.

USHKOV A.A. 1(3)141
INTERNATIONAL ATOMIC ENERGY AGENCY, VIENNA.
AQUEOUS REPROCESSING CHEMISTRY FOR IRRADIATED FUELS.
REPORT ON AN INTERNATIONAL SYMPOSIUM IN BRUSSELS, BELGIUM, 23 - 26 APRIL 1963.
CONFERENCES AND SYMPOSIA.
VOL. 1, NO. 3 (1963) P. 141-147.

GOLDANSKY V.I. 1(4) 3
INSTITUTE OF CHEMICAL PHYSICS, ACADEMY OF SCIENCES OF THE USSR, MOSCOW, UNION OF SOVIET SOCIALIST REPUBLICS.
THE MOESSBAUER EFFECT AND ITS APPLICATIONS IN CHEMISTRY.
VOL. 1, NO. 4 (1963) P. 3-70.

THE RELATIONSHIP BETWEEN NUCLEAR PROPERTIES AND TRANSFORMATIONS AND ELECTRON SHELL STRUCTURE CAN BE OBSERVED IN A NUMBER OF PHENOMENA - ISOTOPE AND ISOMERIC OPTICAL SHIFTS, CHEMICAL SHIFTS IN NMR AND NQR SPECTRA, AND CHANGES IN THE LIFETIME OF ISOTOPES UNDERGOING ELECTRON CAPTURE OR ISOMERIC TRANSITION WITH CONVERSION.
A STRIKING EXAMPLE OF THIS TYPE OF RELATIONSHIP IS PROVIDED BY THE WAY THE SHAPE OF MOESSBAUER SPECTRA VARIES AS A FUNCTION OF THE CHEMICAL STATE OF ATOMS WHICH EMIT AND ABSORB GAMMA-QUANTA. IN THIS SURVEY, THE GENERAL CHARACTERISTICS OF THE MOESSBAUER EFFECT, ISOMERIC (CHEMICAL) SHIFTS AND QUADRUPOLE SPLITTING OF MOESSBAUER SPECTRAL LINES ARE DESCRIBED. CHARACTERISTICS OF THE MOESSBAUER EFFECT WHICH ARE IMPORTANT IN CONJUNCTION WITH ITS APPLICATION TO PROBLEMS OF MOLECULAR STRUCTURE - SUCH AS THE PREVALENCE OF MOESSBAUER NUCLEI, THE ROLE OF A LIGHT-ATOM ENVIRONMENT, 'SHORT-RANGE' AND 'LONG-RANGE' EFFECTS AND RELAXATION TIMES - ARE ALSO DISCUSSED.
THE MOST IMPORTANT CHEMICAL ASPECTS OF THE FIRST MOESSBAUER EXPERIMENTS IN IRON ARE CONSIDERED, STUDIES DEALING WITH LOCAL MAGNETIC FIELDS IN FE(2+) AND FE(3+), THE CONTRIBUTION OF S ELECTRONS TO THE VALENCE BONDS OF IRON ATOMS, COMPOUNDS IN WHICH IRON PERFORMS A DOUBLE FUNCTION, THE CHEMICAL STATES OF IRON AFTER BETA-DECAY OF COBALT, AND A STUDY OF FERROCENE AND ITS DERIVATIVES.
SIMILARLY, THE SURVEY DEALS WITH THE BASIC CHEMICAL ASPECTS OF THE FIRST MOESSBAUER EXPERIMENTS IN TIN. THIS INCLUDES THE PROBLEM OF COVALENT AND IONIC BONDS IN SN(2+) AND SN(4+), THE ROLE OF CO-ORDINATION BONDS, THE ROLE OF ELECTRONEGATIVITY IN ATOMS NEAR TIN, THE STRUCTURAL DIFFERENCES BETWEEN STANNIC TETRAFLUORIDE AND OTHER TETRAHALIDES AND INDUCTIVE AND MESOMERIC EFFECTS IN MOESSBAUER SPECTRA. THE NATURE OF LINE SPLITTING IS DISCUSSED, AS IS THE POSSIBILITY OF STUDYING THE PROPERTIES OF MONOCRYSTALS IN POLYCRYSTALLINE SAMPLES. MOESSBAUER SPECTRA OF ORGANO-TIN COMPOUNDS AND THEIR STRUCTURAL PROPERTIES, AS WELL AS THE MOESSBAUER EFFECT IN TIN-BEARING POLYMERS ARE CONSIDERED.
IN CONCLUSION, A FEW QUESTIONS OF GENERAL INTEREST ARE CONSIDERED, INCLUDING THE PROSPECTS OF USING THE MOESSBAUER EFFECT IN CHEMISTRY. THE AUTHOR DISCUSSES THE INFLUENCE OF THE NEAREST AS WELL AS THE MORE REMOTE INTRAMOLECULAR BONDS -- COLLECTIVE INTERACTION IN POLYMERS (IN CONJUNCTION WITH THE KINETICS OF SOLID-PHASE POLYMERIZATION AND THE ROLE OF PHASE TRANSITIONS) -- THE STRUCTURE OF COMPLEX COMPOUNDS -- THE POSSIBILITY OF STUDYING THE KINETICS OF TOPOCHEMICAL AND LIQUID-PHASE REACTIONS -- RADIATION-DAMAGE STUDIES, INCLUDING THE PROBLEMS OF 'ANNEALING' AND 'RETENTION' -- THE POSSIBILITY OF MAKING ANALYTICAL MEASUREMENTS -- AND FINALLY, THE POSSIBILITY OF OBSERVING RESONANCE SCATTERING AND ABSORPTION IN CONNECTION WITH MACROMOLECULAR RECOIL.

DOUGLASS D.L.
VALLECITOS ATOMIC LABORATORY, GENERAL ELECTRIC COMPANY,
PLEASANTION, CALIFORNIA, UNITED STATES OF AMERICA.
THE PHYSICAL METALLURGY OF ZIRCONIUM.
VOL. 1, NO. 4 (1963) P. 71-237.

A CRITICAL REVIEW AND ANALYSIS OF THE PHYSICAL METALLURGY OF ZIRCONIUM HAS BEEN MADE FOR THE PERIOD 1953-1963 IN ORDER TO BRING THE SUBJECT UP TO DATE SINCE THE PUBLICATION OF BOOKS BY LUSTMAN AND KERZE AND BY MILLER. TOPICS COVERED INCLUDE - CRYSTALLOGRAPHY, PHYSICAL PROPERTIES, DEFORMATION AND TEXTURES, RECOVERY, RECRYSTALLIZATION, AND GRAIN GROWTH, THEORY OF ALLOYING, PHASE EQUILIBRIA, PHASE TRANSFORMATIONS AND HEAT TREATMENT, MECHANICAL PROPERTIES, DIFFUSION, AND IRRADIATION EFFECTS.

GENNA S., JAEGER R.G., NAGL J., SANIELEVICI A.
INTERNATIONAL ATOMIC ENERGY AGENCY, VIENNA.
QUASI-ADIABATIC CALORIMETER FOR THE DIRECT DETERMINATION OF RADIATION DOSE IN RAD.
CURRENT RESEARCH AND DEVELOPMENT.
VOL. 1, NO. 4 (1963) P. 239-254.

A QUASI-ADIABATIC CALORIMETER WITH AN AUTOMATIC TEMPERATURE-CONTROL SYSTEM AND ACCESSORIES FOR ELECTRICAL CALIBRATION AND DETERMINATION OF EXTERNAL RADIATION BEAM DOSE IS DESCRIBED. THE BASIC THEORETICAL BACKGROUND OF THE METHOD IS DISCUSSED. CALIBRATION DIAGRAMS AND THEIR EVALUATION IN THE DOSE RANGE ABOVE 20 RAD/MIN WITH AN ACCURACY OF WITHIN PLUS OR MINUS 1 PER CENT ARE GIVEN. THE INSTRUMENT, WHICH IS CONSTRUCTED ENTIRELY FROM TISSUE EQUIVALENT MUSCLE (T.E.M.) MATERIAL, CAN BE EASILY MOVED FOR INTERCOMPARISON AND STANDARDIZATION PURPOSES.

DISTEFANO J.R., HOFFMAN E.E.
METALS AND CERAMICS DIVISION, OAK RIDGE NATIONAL LABORATORY, OAK RIDGE, TENNESSEE, UNITED STATES OF AMERICA.
CORROSION MECHANISMS IN 'REFRACTORY METAL-ALKALI METAL' SYSTEMS.
VOL. 2, NO. 1 (1964) P. 3-33.

LIQUID METALS MAKE EXCELLENT HIGH-TEMPERATURE COOLANTS BECAUSE OF THEIR LOW VAPOUR PRESSURES AND EXCELLENT HEAT-TRANSFER COEFFICIENTS. THESE PROPERTIES RECOMMEND THEIR USE IN NUCLEAR POWER REACTORS WHERE VERY HIGH HEAT FLUXES FROM THE NUCLEAR FUEL ARE PRESENT. LIQUID METALS ARE ALSO MOST ATTRACTIVE COOLANTS AND WORKING FLUIDS FOR SPACE POWER SYSTEMS WHICH REQUIRE COMPACT DESIGN.
THE USE OF LIQUID METALS, HOWEVER, INTRODUCES SOLID-LIQUID METAL INTERACTIONS WHICH ARE NOT PRIMARILY ELECTRO-CHEMICAL, AS FOUND IN SYSTEMS INVOLVING AQUEOUS MEDIA. THE CORROSION OF SOLID METALS BY THESE COOLANTS OCCURS AS THE SYSTEM ATTEMPTS TO ATTAIN CHEMICAL EQUILIBRIUM. THE MECHANISMS BY WHICH THIS CAN OCCUR ARE (A) DISSOLUTION, WHICH RESULTS FROM THE SOLUBILITY RELATIONSHIPS BETWEEN THE SOLID AND LIQUID METALS, AND (B) IMPURITY REACTIONS, RESULTING FROM THE PRESENCE OF INTERSTITIAL IMPURITIES SUCH AS OXYGEN, NITROGEN, AND CARBON, IN THE SOLID AND LIQUID METALS. THE MANNER IN WHICH DISSOLVING PROCEEDS GIVES RISE TO MANY TYPES OF ATTACK, RANGING FROM SIMPLE SOLUTION TO MASS TRANSFER OF ONE OR MORE CONSTITUENTS OF AN ALLOY. SOME VARIABLES WHICH INFLUENCE THE RATE AND TYPE OF DISSOLUTIVE CORROSION ARE TEMPERATURE, FLOW VELOCITY, SURFACE AREA TO VOLUME RATIO, SURFACE CONDITION OF SOLID METAL, TEMPERATURE GRADIENT AND NUMBER OF MATERIALS IN CONTACT WITH THE SAME LIQUID METAL.
THE REFRACTORY METALS TUNGSTEN, MOLYBDENUM, TANTALUM AND NIOBIUM, AS WELL AS OTHER HIGH-MELTING BODY-CENTRED CUBIC METALS, HAVE EXCELLENT RESISTANCE TO DISSOLUTIVE ATTACK BY THE ALKALI LIQUID METALS AT HIGH TEMPERATURES. HOWEVER, THERE ARE NUMEROUS

OCCASIONS WHEN IT IS DESIRABLE TO UTILIZE THE UNIQUE CAPABILITIES OF SEVERAL STRUCTURAL MATERIALS IN THE SAME SYSTEM. A FEW EXPERIMENTS HAVE BEEN CONDUCTED WHICH SHOW THAT, WHEN MORE THAN ONE TYPE OF SOLID METAL OR ALLOY IS IN CONTACT WITH AN ALKALI METAL, THE TENDENCY FOR THE SYSTEM TO ACHIEVE EQUILIBRIUM RESULTS IN A NUMBER OF COMPLEX INTERACTIONS INVOLVING INTERCHANGE OF METALLIC AND NON-METALLIC CONSTITUENTS. THESE INTERACTIONS GENERALLY ARE DELETERIOUS AND THEREFORE CHOICE OF MATERIALS MAY BE LIMITED.
THE MOST SIGNIFICANT CORROSION PROBLEM INVOLVING REFRACTORY METALS APPEARS TO BE THE INFLUENCE OF THE IMPURITIES, OXYGEN, NITROGEN AND CARBON. EXPERIMENTS HAVE BEEN CONDUCTED TO STUDY THE EFFECT OF SUCH IMPURITIES IN BOTH THE REFRACTORY METALS AND ALKALI METALS. AS AN EXAMPLE, DATA ARE PRESENTED WHICH SHOW THAT THE PRESENCE OF SMALL QUANTITIES OF OXYGEN IN EITHER TANTALUM OR NIOBIUM RESULTS IN THE PENETRATION OF THESE METALS BY LITHIUM OVER A WIDE RANGE OF TEMPERATURES. IT HAS ALSO BEEN FOUND THAT OXYGEN IN SODIUM INCREASES THE CORROSION RATE WHEN IN CONTACT WITH NIOBIUM AND OTHER REFRACTORY METALS. IN ADDITION, A METHOD OF PREDICTING THE REDISTRIBUTION OF IMPURITIES WHICH ARE PRESENT IN SOLUTION IN EITHER THE SOLID OR LIQUID METAL IS COMPARED WITH EXPERIMENTAL RESULTS.
THE CORROSION OF SOLID METALS BY LIQUID METALS OFTEN OCCURS IN COMPLEX MULTI-COMPONENT SYSTEMS. FOR THIS REASON, FURTHER DATA ON SOLUBILITIES OF SINGLE COMPONENTS, MULTI-COMPONENT EFFECTS, TEMPERATURE COEFFICIENTS OF SOLUBILITIES, AND KINETICS OF DISSOLUTION AND PRECIPITATION OF SOLID METALS ARE NEEDED. IT IS ALSO SUGGESTED THAT MORE EMPHASIS BE PLACED ON ANALYTICAL TECHNIQUES FOR DETERMINING THE CONCENTRATIONS OF OXYGEN, NITROGEN AND CARBON IN LIQUID METALS IN ORDER THAT THEIR EFFECTS UPON THE VARIOUS CORROSION PROCESSES MIGHT BE BETTER UNDERSTOOD.

NOSWORTHY J.M., SWALLOW A.J. 2(1) 3
PHYSICS DEPARTMENT, GUY'S HOSPITAL MEDICAL SCHOOL, LONDON, ENGLAND. PATERSON LABORATORIES, CHRISTIE HOSPITAL AND HOLT RADIUM INSTITUTE, MANCHESTER, ENGLAND.
SOME TRENDS IN RADIATION CHEMISTRY.
VOL. 2, NO. 1 (1964) P. 35-63.

FUNDAMENTAL RADIATION CHEMISTRY HAS EXPANDED GREATLY IN RECENT YEARS. MANY OF THE ADVANCES HAVE DERIVED FROM NEW EXPERIMENTAL TECHNIQUES, ALTHOUGH THE BASIC CONCEPTS OF THE SUBJECT HAD ALREADY BEEN PUT FORWARD AS A RESULT OF RELATIVELY SIMPLE EXPERIMENTS BY THE NINETEEN-THIRTIES. THE PROBLEMS IN GENERAL RADIATION CHEMISTRY INCLUDE ACCOUNTING FOR THE RADIOSENSITIVITY OF PURE COMPOUNDS AND MIXTURES, UNDERSTANDING THE ROLE OF INTERMEDIATES, AND EXPLAINING THE MANNER IN WHICH ENERGY IS DISTRIBUTED BETWEEN THE COMPONENTS OF AN IRRADIATED SYSTEM. IN THE RADIOLYSIS OF AQUEOUS SOLUTIONS, RESULTS CAN BE INTERPRETED IN TERMS OF THE INITIAL FORMATION OF FREE RADICALS AND THE RECENTLY DISCOVERED SOLVATED ELECTRONS. CHEMICAL SYSTEMS ARE CONVENIENT FOR RADIATION DOSIMETRY. USE OF THE FRICKE DOSIMETER IS NOW WELL ESTABLISHED, ALTHOUGH IT IS STILL CAPABLE OF FURTHER DEVELOPMENT. A NEED STILL EXISTS FOR OTHER CHEMICAL DOSIMETERS. SOME OF THE MOST REMARKABLE ADVANCES IN RADIATION CHEMISTRY HAVE BEEN IN THE POLYMER FIELD. THE STUDY OF THE NATURE AND REACTIONS OF THE FREE RADICALS IN IRRADIATED POLYMETHYL METHACRYLATE BY MEANS OF THE ELECTRON SPIN RESONANCE TECHNIQUE IS A TYPICAL INVESTIGATION INTO AN IMPORTANT ASPECT OF THE MECHANISM OF THE ACTION OF RADIATION ON A POLYMER.

KOMAROV E. 2(1) 65
INTERNATIONAL ATOMIC ENERGY AGENCY, VIENNA.
BIOLOGICAL EFFECTS OF NEUTRON IRRADIATIONS.
REPORT ON AN INTERNATIONAL SYMPOSIUM AT THE BROOKHAVEN NATIONAL LABORATORY, UPTON, N.Y., 7 - 11 OCTOBER 1963.
CONFERENCES AND SYMPOSIA.
VOL. 2, NO. 1 (1964) P. 65-77.

COLEMAN C.F.
OAK RIDGE NATIONAL LABORATORY, OAK RIDGE, TENNESSEE, UNITED STATES OF AMERICA.
AMINE EXTRACTION IN REPROCESSING.
VOL. 2, NO. 2 (1964) P. 3-54.

IN THE SIXTEEN YEARS SINCE AMINE EXTRACTION WAS FIRST REPORTED, IT HAS DEVELOPED INTO ONE OF THE MAJOR CATEGORIES OF SOLVENT EXTRACTION SYSTEMS. ITS INDUSTRIAL USE, PARTICULARLY IN THE HYDROMETALLURGICAL PROCESSING OF URANIUM AND RELATED METALS, HAS BOTH STIMULATED AND BENEFITED FROM THE COMMERCIAL PRODUCTION OF AN INCREASING RANGE OF HIGH MOLECULAR WEIGHT AMINES, ESPECIALLY SECONDARY AND TERTIARY AMINES. AMINE EXTRACTION APPEARS TO PROMISE SPECIAL ADVANTAGES IN SEVERAL ASPECTS OF NUCLEAR FUEL REPROCESSING BY VIRTUE OF HIGH EXTRACTION POWER, SELECTIVITY AND REAGENT STABILITY.
THIS REVIEW PRESENTS RECENT DEVELOPMENTS AND CURRENT STATUS IN AMINE EXTRACTION SYSTEMS AS PERTINENT TO THEIR POTENTIAL USE IN NUCLEAR FUEL REPROCESSING, INCLUDING BOTH STUDIES OF THE EXTRACTION SYSTEMS PER SE AND THEIR ADAPTATION TO PARTICULAR PROCESS USES. PROPOSED CHEMICAL FLOWSHEETS ARE CITED FOR A NUMBER OF PROCESSES IN AND AUXILIARY TO FUEL REPROCESSING. LITERATURE REFERENCES ARE ARRANGED SO AS TO FACILITATE ACCESS TO PREVIOUS REVIEWS AND BIBLIOGRAPHIES AND TO SPECIALIZED STUDIES OF THE AMINE SYSTEMS.

ROTH E., RAVOIRE J.
DEPARTMENT OF STABLE ISOTOPES, CENTRE D'ETUDES NUCLEAIRES, SACLAY, FRANCE.
METHODS OF HYDROGEN - DEUTERIUM ANALYSIS USED AT SACLAY.
(IN FRENCH)
VOL. 2, NO. 2 (1964) P. 55-74.

ISOTOPE CHEMISTRY AND THE STUDY OF ISOTOPE DISTRIBUTION IN NATURE INVOLVE THE USE OF VARIOUS ISOTOPE ANALYSIS METHODS. IN THIS ARTICLE THE METHODS DEVELOPED AT SACLAY IN THE DEPARTMENT OF STABLE ISOTOPES FOR THE STUDY OF HYDROGEN-DEUTERIUM SYSTEMS ARE PRESENTED. THEY CONSIST OF MASS SPECTROSCOPY, INFRA-RED SPECTROSCOPY, DENSITY DOSIMETRY, THERMAL CONDUCTIVITY AND GAS CHROMATOGRAPHY. THESE METHODS PERMIT THE SATISFACTORY SOLUTION OF DEUTERIUM-ANALYSIS PROBLEMS IN HYDROGEN AND WATER.

KEEPIN G.R.
INTERNATIONAL ATOMIC ENERGY AGENCY, VIENNA.
PULSED NEUTRON RESEARCH IN NEUTRON AND REACTOR PHYSICS.
VOL. 2, NO. 2 (1964) P. 75-95.

THE CAPABILITIES OF THE PULSED NEUTRON TECHNIQUE FOR NEUTRON AND REACTOR PHYSICS RESEARCH ARE REVIEWED. A WEALTH OF RECENT EXPERIMENTAL AND THEORETICAL RESULTS IS EXAMINED WITH A VIEW TOWARD THE FUTURE POTENTIAL OF THE PULSED METHOD AS AN INCISIVE RESEARCH TOOL.

SEMENOV B.A.
INTERNATIONAL ATOMIC ENERGY AGENCY, VIENNA.
PHYSICS AND MATERIAL PROBLEMS OF REACTOR CONTROL RODS.
REPORT ON AN INTERNATIONAL SYMPOSIUM IN VIENNA, AUSTRIA, 11 - 15 NOVEMBER 1963.
CONFERENCES AND SYMPOSIA.
VOL. 2, NO. 2 (1964) P. 97-107.

LAWROSKI S., BURRIS L. JR. 2(3) 3
ARGONNE NATIONAL LABORATORY, ARGONNE, ILLINOIS, UNITED STATES OF AMERICA.
PROCESSING OF REACTOR FUEL MATERIALS BY PYROMETALLURGICAL METHODS.
VOL. 2, NO. 3 (1964) P. 3-69.

PYROMETALLURGICAL PROCESSES ARE UNDER DEVELOPMENT IN ORDER TO ACHIEVE RAPID RECYCLE OF HIGH-BURN-UP REACTOR FUELS. POTENTIAL ECONOMIC ADVANTAGES OF THESE PROCESSES LIE IN THEIR ABILITY TO HANDLE SHORT-COOLED FUELS, WHICH PERMITS OF MINIMUM FUEL INVENTORIES, AND IN THE AVOIDANCE OR SIMPLIFICATION OF CHEMICAL CONVERSIONS. THE PROCESSES UTILIZE HIGH TEMPERATURE SEPARATIONS IN WHICH THE FUEL IS EITHER MAINTAINED IN THE METALLIC STATE OR SUBJECTED TO A MINIMUM OF CHEMICAL CONVERSIONS. LIQUID METALS AND SALTS ARE FREQUENTLY USED AS SOLVENTS. IN THIS REPORT, THE PRINCIPLES OF PYROMETALLURGICAL PROCESSES ARE DISCUSSED AND THE HISTORY OF PYROMETALLURGICAL PROCESS DEVELOPMENT IS REVIEWED BRIEFLY. EMPHASIS IS GIVEN TO RECENT DEVELOPMENTS AND ESPECIALLY TO IMPENDING DEMONSTRATIONS OF THESE PROCESSES FOR RECOVERY OF FUEL MATERIALS DISCHARGED FROM ARGONNE NATIONAL LABORATORY'S SECOND EXPERIMENTAL BREEDER REACTOR (EBR-II). FUEL FROM THIS REACTOR WILL BE PROCESSED AND RE-FABRICATED INTO NEW FUEL ELEMENTS FOR RETURN TO THE REACTOR IN AN ADJACENT PROCESSING PLANT, KNOWN AS THE EBR-II FUEL CYCLE FACILITY.

GORYACHEV B.I. 2(3) 71
NUCLEAR PHYSICS RESEARCH INSTITUTE OF THE MOSCOW STATE UNIVERSITY, MOSCOW, UNION OF SOVIET SOCIALIST REPUBLICS.
CROSS-SECTIONS OF PHOTONUCLEAR REACTIONS.
TABULATED EXPERIMENTAL DATA.
VOL. 2, NO. 3 (1964) P. 71-148.

THIS PROVIDES A SUMMARY OF EXPERIMENTAL RESULTS RELATING TO THE THRESHOLDS, CROSS-SECTIONS AND YIELDS OF PHOTONUCLEAR REACTIONS. WORK PUBLISHED IN PERIODICALS UP TO THE MIDDLE OF 1963 IS INCLUDED IN THE TABLE, WHICH IS BASED ON A BREAKDOWN OF THE EXPERIMENTAL MATERIAL BY ELEMENTS (FROM SODIUM TO THE TRANSURANIUM ELEMENTS), THE PAPERS RELATING TO EACH ELEMENT BEING ARRANGED IN ALPHABETICAL ORDER. EXCEPT FOR A FEW 'OLD' PAPERS, THE DATA CONTAINED IN ALL PUBLISHED WORKS WERE USED, PROVIDED THEY COULD BE ADAPTED TO THE TABULAR ARRANGEMENT EMPLOYED.

MOSKALEV YU.I., STRELTSOVA V.N. 2(3)149
INSTITUTE FOR BIOPHYSICS OF THE ACADEMY OF SCIENCES OF THE USSR, MOSCOW, UNION OF SOVIET SOCIALIST REPUBLICS.
THE CARCINOGENIC EFFECTS OF IONIZING RADIATION.
A REVIEW OF CURRENT PROBLEMS.
VOL. 2, NO. 3 (1964) P. 149-194.

A GREAT DEAL OF ORIGINAL WORK AND A LARGE NUMBER OF REVIEW ARTICLES HAVE BEEN DEVOTED TO QUESTIONS OF THE TUMOUR-PRODUCING EFFECT OF RADIATION. A SPECIAL FEATURE OF THE PRESENT REVIEW IS THAT IT ANALYSES THE DISTINCTIVE CHARACTERISTICS OF THE CARCINOGENIC EFFECT OF EXTERNAL AND INTERNAL SOURCES OF IONIZING RADIATION DEPENDING ON THE RADIATION CONDITIONS AND THE ORGANS OR TISSUES INVOLVED, THE TIME FACTOR, THE MECHANISMS BY WHICH TUMOURS OCCUR AND THE DOSE-EFFECT AND THRESHOLD PROBLEMS. A NUMBER OF NEW THESES ARE ADVANCED, PRINCIPALLY WITH REGARD TO THE DOSE-EFFECT AND THRESHOLD PROBLEMS. THE AUTHORS DO NOT DWELL ON THE HISTORY OF THE QUESTION OR ON PARTICULAR ASPECTS OF IT, BUT REFER THE READER TO THE SPECIALIZED LITERATURE COMPRISED IN AN EXTENSIVE LIST OF REFERENCES AT THE END OF THE REVIEW. DATA ARE GIVEN ON THE COMPARATIVE EFFECT OF VARIOUS ISOTOPES.

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DEPARTMENT OF NUCLEAR CHEMISTRY, FACULTY OF TECHNICAL AND NUCLEAR PHYSICS, CZECHOSLOVAK INSTITUTE OF TECHNOLOGY, PRAGUE, CZECHOSLOVAK SOCIALIST REPUBLIC.
SUBSTOICHIOMETRY IN RADIOCHEMICAL ANALYSIS.
VOL. 2, NO. 4 (1964) P. 3-58.

SUBSTOICHIOMETRIC SEPARATION IS MORE SELECTIVE THAN OTHER RADIOCHEMICAL SEPARATION PROCEDURES, FOR IT IS BASED ON THE USE OF STRICTLY CONTROLLED AMOUNTS OF REAGENT (CHELATING, EXTRACTING, PRECIPITATING) IN QUANTITIES LESS THAN THOSE WHICH STOICHIOMETRICALLY CORRESPOND TO THE AMOUNT OF THE ELEMENT TO BE SEPARATED. MOREOVER, THE SUBSTOICHIOMETRIC PRINCIPLE AVOIDS THE NECESSITY OF DETERMINING THE CHEMICAL YIELD. IN THE PRESENT PAPER IS GIVEN THE THEORY FROM WHICH THE BEST CONDITIONS CAN BE CALCULATED FOR ATTAINING MAXIMUM SELECTIVITY AND REPRODUCIBILITY OF DETERMINATION. THE USE OF SUBSTOICHIOMETRY IN ACTIVATION ANALYSIS, ISOTOPE DILUTION AND IN THE RADIOCHEMICAL ANALYSIS OF MIXTURES OF RADIOISOTOPES, SUCH AS RADIOACTIVE PREPARATIONS AND FISSION PRODUCTS, IS EXPLAINED, OPTIMUM CONDITIONS FOR DETERMINATION OF TRACES OF 24 METALLIC ELEMENTS ARE GIVEN. ADVANTAGES, DISADVANTAGES AND TRENDS IN SUBSTOICHIOMETRY ARE DISCUSSED.

VASKOV L.S.
RADIOBIOLOGY INSTITUTE, SOFIA, BULGARIA.
CLINICAL DIAGNOSIS AND THERAPY OF CHRONIC RADIATION INJURIES.
(IN RUSSIAN)
VOL. 2, NO. 4 (1964) P. 59-94.

THE REVIEW COVERS 270 BOOKS AND ARTICLES PUBLISHED IN RECENT YEARS. ATTENTION IS PAID PRIMARILY TO THE CLASSIFICATION, CAUSAL MECHANISM AND CLINICAL PICTURE OF CHRONIC RADIATION INJURIES, AND TO THEIR DIFFERENTIAL DIAGNOSIS. DIFFERENCES IN THE PATHOGENESIS OF RADIATION INJURY ARE INDICATED. ON THE OTHER HAND, A DESCRIPTION OF BIOPHYSICAL, RADIOMETRIC, AUTORADIOGRAPHIC AND OTHER SPECIAL METHODS OF DIAGNOSING RADIATION INJURIES FALLS OUTSIDE THE PRESCRIBED SCOPE OF THE REVIEW. THE ARTICLE REFLECTS THE PRESENT STATUS OF RESEARCH AS REGARDS INDICES FOR CLINICAL USE AND METHODS OF TREATMENT, A VERY LIMITED ASSORTMENT OF WHICH IS ALL THAT IS SO FAR AVAILABLE.

BRUNSON G.S., OLIVEIRA J.M.
INTERNATIONAL ATOMIC ENERGY AGENCY, VIENNA. LABORATORIO DE FISICA E ENGENHARIA NUCLEARES, SACAVEM, PORTUGAL.
PROMPT-NEUTRON LIFETIME MEASUREMENTS WITH AN IMPROVISED TIME ANALYSER IN THE 'REACTOR PORTUGUES DE INVESTIGACAO (RPI)'.
CURRENT RESEARCH AND DEVELOPMENT.
VOL. 2, NO. 4 (1964) P. 95-103.

THE ROSSI-ALPHA METHOD MAKES USE OF THE CORRELATION OF NEUTRON DETECTIONS TO OBTAIN THE AVERAGE PERIOD OF PROMPT-NEUTRON CHAINS IN A NEUTRON MULTIPLYING SYSTEM NEAR CRITICAL. PULSES FROM A NEUTRON DETECTOR OF HIGH SENSITIVITY AFTER AMPLIFICATION IN CONVENTIONAL ELECTRONICS ARE CARRIED TO A TIME ANALYSER, WHICH, STARTING WITH SOME NEUTRON PULSE, EXAMINES SUBSEQUENT INCREMENTS OF TIME FOR DELAYED COINCIDENCES. AFTER MANY CYCLES OF ANALYSIS, WE OBTAIN A DISTRIBUTION OF DELAYED COINCIDENCES, WHICH, WHEN CORRECTED FOR RANDOM EVENTS, YIELDS AN EXPONENTIAL SLOPE CORRESPONDING TO DELTA K-RHO/TAU-ZERO, WHERE DELTA K-RHO IS THE REACTIVITY OF THE SYSTEM RELATIVE TO PROMPT CRITICAL AND TAU-ZERO IS THE PROMPT NEUTRON LIFETIME OF THE SYSTEM.
THE EXPERIMENT IS WIDELY PERFORMED SINCE THE LIFETIME HAS PRACTICAL AS WELL AS ACADEMIC INTEREST -- THE PROMPT-NEUTRON LIFETIME IS ONE OF THE FACTORS ENTERING INTO ANY COMPREHENSIVE HAZARDS ANALYSIS.

ERMALLY THE TIME ANALYSERS USED IN THIS MEASUREMENT ARE
NTRICATE AND EXPENSIVE. THE PRESENT WORK IS OF INTEREST BECAUSE
E HAVE ACCOMPLISHED THE MEASUREMENT WITH MINIMAL EQUIPMENT -- A
NVENTIONAL NEUTRON DETECTING CHANNEL, AN OSCILLOSCOPE, AN
SCILLOSCOPE CAMERA, AND A MOTOR-DRIVEN POTENTIOMETER. THE SWEEP
F THE OSCILLOSCOPE WAS TRIGGERED BY NEUTRON PULSES. ANY PULSES
RIVING DURING THE SWEEP CAUSED A MOMENTARY SPOT OF LIGHT TO
PEAR AT SOME X-COORDINATE REPRESENTING THE DELAY FROM THE
NITIATING PULSE. THESE SPOTS WERE RECORDED PHOTOGRAPHICALLY AND
OUNTED BY HAND.
NALYSIS OF DATA TAKEN WITH A HIGH SENSITIVITY FISSION COUNTER IN
HE REACTOR PORTUGUES DE INVESTIGACAO YIELDED A PROMPT NEUTRON
IFETIME OF 48 PLUS OR MINUS 4 MICROSECONDS AS COMPARED WITH A
ALCULATED LIFETIME OF 52.8 MICROSECONDS.
INCE THIS EXPERIMENT MAY HAVE PEDAGOGICAL INTEREST, WE OFFER
OME CRITERIA FOR FEASIBILITY. IN GENERAL A GOOD EXPERIMENT
EQUIRES --
. A TOTAL SPONTANEOUS NEUTRON SOURCE LESS THAN ONE FIFTH OF A
EUTRON/TAU-ZERO.
. A COUNTER SENSITIVITY GREATER THAN 0.01-SQUARE-ROOT OF
AU-ZERO COUNTS/FISSION (FOR REACTORS FUELLED WITH URANIUM-235).
OR SYSTEMS FUELLED WITH PLUTONIUM OR URANIUM-233, THE COUNTER
ENSITIVITY SHOULD BE GREATER THAN 0.002-SQUARE-ROOT OF TAU-ZERO
OUNTS/FISSION. IF A SYSTEM HAS A LOW SOURCE LEVEL, THE
ENSITIVITY REQUIREMENTS ARE SUBSTANTIALLY REDUCED.
INALLY, THE BEST OVERALL SIGNAL-TO-NOISE RATIO IS OBTAINED 1$
ELOW DELAYED CRITICAL. HOWEVER, WHEN THE SPONTANEOUS SOURCE IS
MALL, IT IS DESIRABLE TO MAKE THE MEASUREMENT NEARER DELAYED
RITICAL SO THAT THE DATA CAN BE BETTER EXTRAPOLATED TO DELAYED
RITICAL.

JONKE A.A.
ARGONNE NATIONAL LABORATORY, ARGONNE, ILLINOIS, UNITED STATES OF
AMERICA.
REPROCESSING OF NUCLEAR REACTOR FUELS BY PROCESSES BASED ON VOLATILIZATION, FRACTIONAL DISTILLATION, AND SELECTIVE ADSORPTION.
VOL. 3, NO. 1 (1965) P. 3-60.

ALTHOUGH THE REPROCESSING OF IRRADIATED FUELS HAS BEEN
ACCOMPLISHED SUCCESSFULLY FOR MANY YEARS BY SOLVENT EXTRACTION
PROCESSES, OTHER REPROCESSING METHODS WHICH DO NOT DEPEND ON
ORGANIC SOLVENTS AND AQUEOUS MEDIA APPEAR TO HAVE IMPORTANT
ECONOMIC ADVANTAGES. ONE SUCH REPROCESSING METHOD DEPENDS UPON
CONVERSION OF FUEL MATERIALS TO VOLATILE COMPOUNDS, SUCH AS
URANIUM HEXAFLUORIDE AND PLUTONIUM HEXAFLUORIDE -- FRACTIONAL
DISTILLATION AND/OR ADSORPTION TECHNIQUES ARE EMPLOYED TO
ACCOMPLISH THE NECESSARY HIGH DEGREE OF SEPARATION OF URANIUM AND
PLUTONIUM FROM FISSION PRODUCTS AND OTHER CONSTITUENTS OF THE
SPENT FUEL.
PROCESSES BASED ON VOLATILIZATION METHODS ARE UNDER DEVELOPMENT
FOR APPLICATION TO A VARIETY OF NUCLEAR FUELS OF BOTH THE
LOW-ENRICHMENT TYPE AND THE HIGH-ENRICHMENT TYPE. SEVERAL
HEAD-END PROCEDURES FOR ACCOMPLISHING THE HALOGENATION REACTIONS
NECESSARY FOR THE PREPARATION OF VOLATILE COMPOUNDS HAVE BEEN
INVESTIGATED IN VARIOUS PILOT PLANTS, SOME OF WHICH HAVE BEEN
OPERATED WITH FULLY IRRADIATED FUEL ELEMENTS. HEAD-END PROCEDURES
EMPLOYING GASEOUS REAGENTS AND FLUIDIZED-BED REACTION EQUIPMENT
HAVE, IN RECENT MONTHS, RECEIVED MAJOR ATTENTION IN UNITED STATES
AND EUROPEAN LABORATORIES.
IN THE CONCEPT OF THE FLUIDIZED-BED FLUORIDE VOLATILITY PROCESS
UNDER DEVELOPMENT, FUEL ELEMENTS OR BUNDLES ARE IMMERSED IN
FLUIDIZED SOLID MEDIA, AND REACTED WITH GASEOUS REAGENTS TO
REMOVE THE CLADDING AND TO CONVERT URANIUM AND PLUTONIUM TO THE
VOLATILE HEXAFLUORIDES. THE LATTER COMPOUNDS ARE THEN
DECONTAMINATED, SEPARATED, AND CONVERTED TO FINAL PRODUCTS FOR
RECYCLE TO NUCLEAR REACTORS.

THE STATUS OF DEVELOPMENT IS APPROACHING A POINT AT WHICH A FULL-SCALE REPROCESSING PLANT COULD BE DESIGNED IN THE NEAR FUTURE FOR SOME TYPES OF FULLY-ENRICHED URANIUM FUELS WHICH DO NOT CONTAIN PLUTONIUM IN RECOVERABLE AMOUNTS. FOR PLUTONIUM-CONTAINING FUELS, A FEW YEARS OF ADDITIONAL DEVELOPMENT WORK MAY BE REQUIRED, ALTHOUGH A COMBINATION OF VOLATILITY AND AQUEOUS PROCESSING METHODS COULD BE PUT INTO OPERATION MUCH SOONER. PILOT PLANTS FOR DEVELOPMENT AND DEMONSTRATION OF THE FLUIDIZED-BED PROCESS WITH IRRADIATED FUEL ELEMENTS ARE UNDER DESIGN OR CONSTRUCTION IN THE UNITED STATES, FRANCE AND BELGIUM.

LOVAS I., ZAMORI Z. 3(1) 61
INSTITUTE FOR THEORETICAL PHYSICS, UNIVERSITY OF COPENHAGEN, DENMARK. RESEARCH INSTITUTE FOR NUCLEAR PHYSICS, CRAKOW, POLAND.
PILE NEUTRONS IN NUCLEAR PHYSICS.
VOL. 3, NO. 1 (1965) P. 61-140.

THE AIM OF THIS REVIEW IS TO OUTLINE THE MAIN FIELDS OF NUCLEAR PHYSICS IN WHICH THE PILE NEUTRONS PLAY AN IMPORTANT ROLE. THE PROBLEMS AND METHODS OF SLOW NEUTRON SPECTROSCOPY ARE DISCUSSED, INCLUDING A SHORT SURVEY OF RESONANCE PARAMETER PROPERTIES. THE GENERAL FEATURES OF GAMMA SPECTRA ARISING FROM NEUTRON CAPTURE ARE GIVEN. A SHORT COMPARISON IS MADE OF THE MOST FREQUENTLY APPLIED EXPERIMENTAL TECHNIQUES OF GAMMA SPECTROSCOPY IN THE NEUTRON-GAMMA REACTION STUDIES. DIFFERENT METHODS FOR LEVEL SPIN ASSIGNMENT ARE DISCUSSED. FINALLY SOME FUNDAMENTAL PROBLEMS CONNECTED WITH THE PROPERTIES OF NUCLEAR INTERACTIONS ARE REVIEWED.

WESTCOTT C.H., EKBERG K., HANNA G.C., PATTENDEN N.J., SANATANI S., ATTREE P.M. 3(2) 3
INTERNATIONAL ATOMIC ENERGY AGENCY, VIENNA.
A SURVEY OF VALUES OF THE 2200 M/S CONSTANTS FOR FOUR FISSILE NUCLIDES.
VOL. 3, NO. 2 (1965) P. 3-60.

A STUDY OF THE MOST PROBABLE VALUES OF THE 2200 M/S CONSTANTS FOR THE FISSILE NUCLIDES U-233, U-235, PU-239 AND PU-241 HAS BEEN UNDERTAKEN, USING A LEAST-SQUARES FITTING METHOD. THE VARIOUS EXPERIMENTAL DATA HAVE BEEN CAREFULLY REVIEWED. A DETAILED DISCUSSION OF THE PROBLEMS INVOLVED - LARGELY IN ASSESSING THE ACCURACY OF THE INDIVIDUAL MEASUREMENTS AND OF THE FINAL OUTPUT VALUES - IS GIVEN. THE ERRORS ARE QUOTED AS STANDARD DEVIATIONS, AND INCLUDE SOME ALLOWANCE FOR POSSIBLE SYSTEMATIC OR NON-RANDOM CONTRIBUTIONS TO THE ERRORS OF THE ORIGINAL MEASUREMENTS THAT, ALTHOUGH NOT IDENTIFIABLE IN THE INPUT DATA, MAY NEVERTHELESS EXIST.

SPURNY Z. 3(2) 61
INSTITUTE OF NUCLEAR RESEARCH, CZECHOSLOVAK ACADEMY OF SCIENCES, PRAGUE, CZECHOSLOVAK SOCIALIST REPUBLIC.
THERMOLUMINESCENT DOSIMETRY.
VOL. 3, NO. 2 (1965) P. 61-115.

THE REVIEW GIVES AN ANALYSIS OF LITERATURE ON THERMOLUMINESCENT DOSIMETRY UP TO THE SPRING OF 1965. THE HISTORICAL BACKGROUND AND THE NECESSARY THEORY ARE GIVEN. THEN THE PRINCIPLES OF THE METHOD ARE EXPLAINED AND THE ATTEMPTS TO REALIZE A PERSONNEL DOSIMETER ARE BRIEFLY REVIEWED. TYPES OF PHOSPHORS, DOSE AND DOSE-RATE RESPONSES, PRECISION AND LINEARITY OBTAINABLE, TIME STABILITY OF DOSIMETER RESPONSE, TEMPERATURE INFLUENCE AND STABILITY, ENERGY DEPENDENCE AND SENSITIVTY TO DIFFERENT KINDS OF RADIATION (INCLUDING NEUTRONS) ARE ANALYSED. NEXT, CERTAIN OTHER APPLICATIONS OF RADIOTHERMOLUMINESCENCE PHENOMENON ARE MENTIONED AND A COMPARISON OF THE MAIN SOLID-STATE DETECTORS IS PROVIDED. FINALLY THE POSSIBLE TRENDS OF DEVELOPMENT AND UTILIZATION OF

THERMOLUMINESCENT DOSIMETERS ARE DESCRIBED. A VERY FULL SET OF REFERENCES AND ADDITIONAL BIBLIOGRAPHY COMPLETE THE REVIEW AND PROVIDE A TOTAL OF 275 REFERENCES IN THE FIELD.

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NON-ROTATIONAL COLLECTIVE STATES OF DEFORMED EVEN-EVEN NUCLEI.
VOL. 3, NO. 2 (1965) P. 117-193.

THIS REVIEW ARTICLE DESCRIBES THE NON-ROTATIONAL COLLECTIVE STATES IN DEFORMED EVEN-EVEN NUCLEI. THE AUTHOR STATES THE FUNDAMENTAL PROPOSITIONS OF THE SUPERFLUID NUCLEAR MODEL AND SETS FORTH IN DETAIL THE METHOD OF APPROXIMATE SECONDARY QUANTIZATION. THE SECULAR EQUATIONS FOR THE ENERGIES OF QUADRUPOLE AND OCTUPOLE STATES ARE DERIVED, THE SPECIAL FEATURES OF THESE EQUATIONS STUDIED AND THE WAVE FUNCTIONS OF THE COLLECTIVE STATES FOUND. THE AUTHOR ALSO DERIVES EXPRESSIONS FOR THE REDUCED PROBABILITIES OF ALPHA, BETA AND GAMMA TRANSITIONS TO COLLECTIVE STATES. THE EXPERIMENTAL DATA ON THE ENERGIES OF QUADRUPOLE AND OCTUPOLE EXCITED STATES ARE SYSTEMATIZED, AND EXPERIMENTAL DATA PRESENTED ON THE REDUCED PROBABILITIES OF ELECTROMAGNETIC TRANSITIONS FROM COLLECTIVE STATES AND ON ALPHA AND BETA DECAY TO COLLECTIVE STATES.
THE AUTHOR CITES ENERGY CALCULATIONS FOR THE TWO INITIAL QUADRUPOLE AND OCTUPOLE STATES AND FOR A NUMBER OF ELECTROMAGNETIC AND BETA TRANSITION PROBABILITIES. HE GOES ON TO INVESTIGATE THE STRUCTURE OF COLLECTIVE STATES AND TO DETERMINE THE RELATIONSHIP BETWEEN QUASI-PARTICLE AND COLLECTIVE STATES. THEORY AND EXPERIMENT ARE COMPARED AND SHOWN TO BE IN GOOD AGREEMENT. THE AUTHOR COMES TO THE CONCLUSION THAT THE SUPERFLUID NUCLEAR MODEL CORRECTLY DESCRIBES THAT PART OF THE RESIDUAL INTERACTIONS BETWEEN NUCLEONS WHICH IS OF MOST IMPORTANCE IN ATOMIC NUCLEI AT RELATIVELY LOW EXCITATION ENERGIES.

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INTERNATIONAL ATOMIC ENERGY AGENCY, VIENNA.
3(2)195
THE NEUTRON MOISTURE METER AND ITS VALUE IN WATER-USE EFFICIENCY STUDIES.
CURRENT RESEARCH AND DEVELOPMENT.
VOL. 3, NO. 2 (1965) P. 195-212.

LOW AVERAGE CROP YIELDS THROUGHOUT THE WORLD ARE MATTERS OF CONCERN IN AGRICULTURE. WATER SHORTAGE, ESPECIALLY AT CRITICAL PERIOD OF CROP GROWTH, IS THE MAIN CONTRIBUTING FACTOR. WATER-USE EFFICIENCY STUDIES WILL PROVIDE QUANTITATIVE ESTIMATES OF IRRIGATION WATER REQUIRED AT VARIOUS PERIODS OF CROP GROWTH TO ENSURE GOOD AND ECONOMIC YIELDS. SUCH STUDIES INVOLVE KNOWLEDGE OF SEVERAL FACTORS, OF WHICH SOIL MOISTURE CONTENT WAS MOST DIFFICULT TO MEASURE. THE NEUTRON MOISTURE METER IS ABLE TO GIVE RESULTS OF THE NECESSARY ACCURACY AS IT MEASURES LARGE VOLUMES OF SOIL IN SITU AND AT ANY CHOSEN DEPTH. THE DEVICE IS BASED ON THE RELATIVE EFFECTIVENESS OF HYDROGEN (IN WATER) IN MODERATING NEUTRONS AS COMPARED TO THE USUAL ELEMENTS PRESENT IN DRY SOILS -- THE SLOW NEUTRONS SCATTERED BACK TO THE DETECTOR ARE A MEASURE OF THE SOIL MOISTURE CONTENT. THE AUTHOR DISCUSSES THE PRINCIPLES OF THE NEUTRON MOISTURE METER, THE NEUTRON SOURCE, THE RELATIVE MERITS OF SOME OF THE COMMONLY USED DETECTORS (BORONTRIFLUORIDE-TUBES, CRYSTAL SCINTILLATORS, ETC.), AND THEN GOES ON TO REVIEW THE PRACTICAL REALIZATION OF THE DEVICE. BRIEF INDICATIONS ARE GIVEN AS TO HOW ITS RESULTS WILL PROVIDE INFORMATION ON SOIL VARIATION WITH DEPTH, THE DEPTH OF THE ACTIVE ROOT SYSTEM, SOIL MOISTURE CONTENT, FIELD CAPACITY AND IRRIGATION WATER REQUIREMENTS.

SHEVCHENKO V., YUDIN N.
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THE NATURE OF THE GIANT RESONANCE IN PHOTONUCLEAR REACTIONS.
VOL. 3, NO. 3 (1965) P. 3-156.

THE REVIEW IS CONCERNED WITH THE MAIN THEORETICAL AND EXPERIMENTAL RESULTS SO FAR OBTAINED IN STUDIES OF THE NATURE OF THE GIANT RESONANCE (DIPOLE AND QUADRUPOLE COLLECTIVE STATES). AN ACCOUNT IS GIVEN OF THE PROBLEMS ASSOCIATED WITH THE SUM RULES FOR DIPOLE TRANSITIONS AS WELL AS OF THE DIFFERENT MODEL PRESENTATIONS THAT HAVE PROVED SUCCESSFUL IN EXPLAINING THE BASIC FEATURES OF PHOTOEFFECT.

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NUCLEON CLUSTERS IN LIGHT NUCLEI.
VOL. 3, NO. 3 (1965) P. 157-272.

VARIOUS FORMS OF ALPHA CLUSTERING OF NUCLEONS IN LIGHT NUCLEI ARE CONSIDERED. THE ROLE OF THE MAJORANA FORCES AND CHARACTERISTIC FEATURES OF THE CORRESPONDING QUANTUM NUMBERS - THE YOUNG ORBITAL DIAGRAMS (LAMBDA) - ARE DISCUSSED. THE RELATION BETWEEN THE SHELL MODEL AND THE NUCLEON CLUSTERING MODEL (NCM) IS ANALYSED. EXPERIMENTAL DATA ABOUT E LAMBDA TRANSITION PROBABILITIES AND THE RELEVANT FORM FACTORS FOR INELASTIC ELECTRON SCATTERING ARE USED TO DESCRIBE METHODS OF DETERMINING THE NCM PARAMETERS. A WIDE RANGE OF NUCLEAR REACTIONS IS EXAMINED, GIVING ONE A DEEPER UNDERSTANDING OF NUCLEON CLUSTERING, I.E. THE RESONANCE REACTIONS INVOLVING NUCLEON CLUSTERING -- THE DIRECT NUCLEAR REACTIONS OF SUBSTITUTION OF NUCLEON CLUSTERS, AND THE CONNECTION BETWEEN THE CROSS-SECTION OF THE PROCESS AND THE YOUNG DIAGRAM FOR THE INITIAL NUCLEUS -- THE DIPOLE PHOTO-ABSORPTION, EXTENSIVE SPLITTING OF THE GIANT RESONANCE IN LIGHT NUCLEI, AND 'STAR' DECAY INTO NUCLEON CLUSTERS WITH HIGHLY EXCITED STATES (SELECTION RULES FOR YOUNG DIAGRAMS IN NUCLEAR REACTIONS ARE DISCUSSED) -- THE REACTIONS OF QUASI-ELASTIC KNOCK-OUT OF NUCLEON CLUSTERS AT HIGH ENERGIES, AND DATA PROVIDED BY THE EFFECTIVE NUMBERS OF NUCLEON CLUSTERS AS WELL AS THE MOMENTUM DISTRIBUTIONS (THE SELECTION RULES BASED ON THE SU-3 QUANTUM NUMBERS WERE FOUND TO BE VERY USEFUL) -- THE GAMMA-RAY- AND BETA-MESON ABSORPTION BY ALPHA CLUSTERS IN NUCLEI (QUASI-ALPHA-PARTICLE MECHANISM). THE PRESENTATION OF THE PHYSICS PROBLEMS IS INTENDED FOR BOTH THEORETICIANS AND EXPERIMENTAL PHYSICISTS.

MIKHEEV N.B., SPITSYN V.I.
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APPLICATION OF CO-CRYSTALLIZATION AND ADSORPTION IN THE SOLUTION OF CURRENT PROBLEMS OF RADIOCHEMISTRY.
VOL. 3, NO. 4 (1965) P. 3-46.

THE DEVELOPMENT OF CONTEMPORARY RADIOCHEMISTRY AND ATOMIC INDUSTRY RAISES A NUMBER OF PRACTICAL, AS WELL AS PURELY SCIENTIFIC PROBLEMS. ONE OF THE MOST IMPORTANT OF THESE IS THE PROBLEM OF IMPROVING METHODS OF SEPARATION OF RADIOACTIVE ELEMENTS AND ISOTOPES, OFTEN PRESENT IN QUANTITIES THAT CANNOT BE WEIGHED. WHERE PHYSICAL METHODS, SUCH AS ELECTROMAGNETIC OR DIFFUSION, DO NOT APPLY, THE METHODS USED FOR THE SOLUTION OF THIS PROBLEM ARE BASED ESSENTIALLY ON THE DISTRIBUTION OF THE COMPONENTS TO BE SEPARATED BETWEEN PHASES. THE DISTRIBUTION OF THE ELEMENTS BETWEEN THE SOLID AND LIQUID PHASES OFFERS THE BASIS FOR THE PROCESSES OF THEIR SEPARATION BY CO-CRYSTALLIZATION AND ADSORPTION. THE DISTRIBUTION OF THE ELEMENTS BETWEEN 2 LIQUID PHASES OFFERS THE BASIS FOR THE EXTRACTION METHOD, WHILE THE VARYING DISTRIBUTION OF THE ELEMENTS BETWEEN THE FLUID AND

VAPOROUS PHASES MAKES POSSIBLE THEIR SEPARATION BY THE DISTILLATION METHOD.
CO-CRYSTALLIZATION AND ADSORPTION ARE HISTORICALLY THE FIRST METHODS APPLIED IN RADIOCHEMISTRY. AT PRESENT THESE METHODS ARE STILL WIDELY USED IN THE REPROCESSING OF NUCLEAR FUEL, FOR THE DEACTIVATION OF RADIOACTIVE SOLUTIONS AND IN THE SEPARATION OF RADIOISOTOPES AS WELL AS IN VARIOUS RADIOCHEMICAL INVESTIGATIONS. IT IS OBVIOUS THAT THE EFFECTIVENESS OF THE SEPARATION OF ELEMENTS BY THE VARIOUS METHODS, INCLUDING THOSE OF CO-CRYSTALLIZATION AND ADSORPTION, DEPENDS ON THE CHEMICAL STATE OF THE ELEMENTS TO BE SEPARATED AS WELL AS ON THE PHYSICO-CHEMICAL CONDITIONS GOVERNING THE APPLICATION OF THE PROCESS. A CHANGE IN THE PARAMETERS MAY INFLUENCE THE EFFECTIVENESS OF THE SEPARATION OF THE ELEMENTS. RECENTLY THE STUDY OF ADSORPTION PROCESSES ON CRYSTAL PRECIPITATES HAS UNDERGONE CONSIDERABLE DEVELOPMENT, AND THIS METHOD HAS FOUND AN IMPORTANT APPLICATION IN CHROMATOGRAPHY. SINCE THE USE OF PHYSICO-CHEMICAL METHODS FOR SEPARATING RADIOACTIVE SUBSTANCES NECESSARILY INVOLVES DEALING WITH HIGHLY ACTIVE MATERIALS, THE INFLUENCE OF RADIOACTIVITY ON PROCESSES THAT TAKE PLACE IN HETEROGENEOUS SYSTEMS HAS ALSO BEEN STUDIED IN RECENT YEARS. IT HAS BEEN FOUND THAT IN MANY CASES RADIOACTIVITY AFFECTS THE STATE OF THE SYSTEM, EXERTING IN THIS MANNER AN INFLUENCE ON THE PROCESSES OF SEPARATION OF THE ELEMENTS.

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FAST POWER REACTORS.
VOL. 3, NO. 4 (1965) P. 47-87.

THIS PAPER DEALS WITH QUESTIONS RELATED TO THE DEVELOPMENT OF NUCLEAR POWER ON A LARGE SCALE, SUCH AS CAN BE OBTAINED ONLY THROUGH THE USE OF FAST REACTORS.
THE BASIC PHYSICAL CHARACTERISTICS OF FAST POWER REACTORS ARE CONSIDERED -- HIGH BREEDING RATIOS, HIGH POWER DENSITY IN THE CORE, HIGH CONCENTRATION OF FISSILE MATERIAL, USE OF A LIQUID-METAL COOLANT. THE VARIOUS TYPES OF FUEL THAT CAN BE USED AND POSSIBLE METHODS OF ITS CHEMICAL REPROCESSING ARE REVIEWED. THE ECONOMIC CHARACTERISTICS OF FAST POWER REACTORS ARE CONSIDERED TOGETHER WITH POSSIBLE MEANS OF FURTHER IMPROVING THEM.

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INTERNATIONAL ATOMIC ENERGY AGENCY, VIENNA.
FAST REACTOR TECHNOLOGY.
REPORT ON A NATIONAL TOPICAL MEETING HELD BY THE AMERICAN NUCLEAR SOCIETY IN DETROIT, MICH., 26 - 28 APRIL 1965.
CONFERENCES AND SYMPOSIA.
VOL. 3, NO. 4 (1965) P. 89-102.

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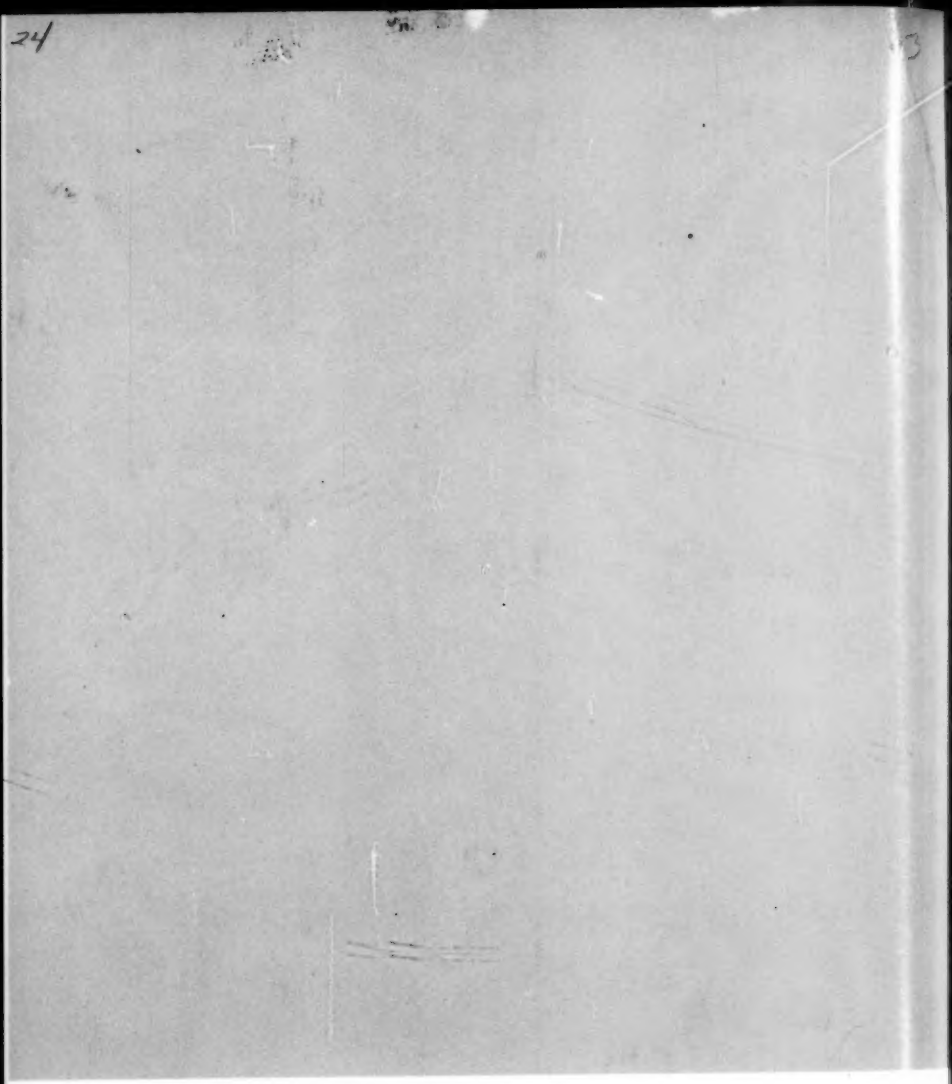

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